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## GEOLOGY AND PALÆONTOLOGY.

THE BAD LANDS OF THE WIND RIVER AND THEIR FAUNA.—These bad lands are situated in the upper drainage basin of the Big Horn river in Western-central Wyoming. Dr. Hayden, who first reported their existence, has referred them to the Wasatch Eocene (see AMERICAN NATURALIST 1878, p. 831). Explorations which I have recently set on foot and placed in charge of Mr. J. L. Wortman, have resulted in the discovery of an interesting fauna, which quite confirms Dr. Hayden's determination of the age of the formation. Mr. Wortman has obtained nineteen species of *Mammalia*, of which nine are new to science, and five have been already found in the Wasatch beds of New Mexico. The following list is given preliminary to further remarks. Rodentia (1-2); *Plesiarctomys*, two species. Mesodonta; *Hyopsodus*, *Pantolestes*, and *Tomitherium*, one species each (5). Chiroptera.

(6) *Vesperugo anemophilus* sp. nov. Represented by the anterior part of a skull without lower jaw. Dentition, I. ?C. 1; P-m. 2; M. 3. Posterior molar narrow, its posterior external V. rudimental; first and second molars subequal. Fourth premolar elevated and acute, with an external basal cingulum; second premolar simple, acute. Profile steeply elevated behind orbital region, less steep in front of it; zygomas wide. Length from interorbital region to above canine alveolus in front .010; interorbital width .005; width of zygomas .012; do. between outsides of last molar teeth .010; length of molar series .008; do. of true molars .004.

Credonta. (7) *Protopsalis tigrinus* gen. et spec. nov. *Char. gen.* Probably *Oxyænida*,<sup>1</sup> but as the type species is only known from two true molars and a canine of the inferior series with bones of the skeleton, this point remains to be ascertained. Femur with a weak third trochanter. Inferior molars, one like those of *Oxyæna*, *i. e.*, with large heel and internal cusp; another, probably the last, larger, without internal tubercle, and with rudimental heel, thus resembling the inferior sectorial of various existing *Carnivora*. *Char. specif.* Size about that of the tiger or jaguar, exceeding that of any other flesh-eater of the Wasatch epoch. The heel of the smaller tubercular-sectorial is not large, and has a plano-concave superior surface. The principal cusp is much elevated, while the internal cusp is small. The sectorial differs from that of a *Hyæna* in having the posterior cusp more and the anterior cusp less elevated; the heel is only a strong posterior cingulum, which is continued as a narrow line along the inner base of the tooth. A rough cutting ridge forms the posterior inner angle of the principal cusp. There is a wide longitudinal groove of the inner face of the inferior canine whose enamel surface is impressed punctate. The shaft of the femur is nearly straight. Diameters of crown of sectorial: anteroposterior

<sup>1</sup> See Proceed. Amer. Philos. Soc., 1880, July.

.025 m.; transverse .014; vertical .022. Length of heel of tubercular sectorial .006; width of same .006. Vertical diameter of base of crown of canine .022. Depth of mandible at last molar .042. Length of femur (condyles inferential) .300; diameter of shaft at middle .034.

(8) *Stypolophus strenuus* Cope. (9) *Stypolophus bicusps* sp. nov. Smaller than the *S. minor* Filh., hence the least species of the genus. It is represented by a nearly complete skull with entire dentition of both jaws. Premaxillary bones rather elongate; general form of skull that of a civet. Crowns of second and third superior premolars compressed, with a prominent cusp behind the principal one. First and second true molars with two distinct external cusps and a strong external basal cingulum. Inferior first premolar one-rooted; third with a posterior heel, and fourth with strong anterior and especially posterior heels. Heels of true molars well developed (last broken). Length of superior dental series to I. 1, .031; do. of molar series .020; do. of true molars .006. Depth of mandible at second true molar .007; do. at canine .0035. The double lobed third premolar and the smaller size distinguish this species from the *S. viverrinus*.

(20) *Didymictis altidens* sp. nov. Represented by several specimens. The species is larger than the *D. protenus*, but the tubercular molar is relatively smaller, and has the three anterior cusps better developed. The heel of the tubercular sectorial is longer, and the three cusps more elevated than in *D. protenus*. Diameters of latter tooth: length anteroposteriorly .015; do of heel .006; elevation of external side of crown anteriorly .015; width at same point .009. Length of crown of tubercular .009; width of do .006; elevation anteriorly .005.

Amblypoda. (11) *Coryphodon* sp. indet. Perissodactyla. (12) *Palæosyops borealis* sp. nov. Founded on a portion of the right maxillary bone, which supports the three true molars and one premolar. Size of *Limnolys fontinalis*, or much smaller than *P. lævidens*. Anterior median tubercle well developed; anterior and posterior cingula strong, not rising to inner cones. A low ridge extending outwards and forwards from posterior cone. Enamel smooth. Differs from *P. junior* Leidy in the presence of the intermediate tubercle and crest, and in the weak external cingulum. Length of true molar series .063; diameters of first true molar, anteroposterior, .019; transverse, .020.

(13) *Lambdaotherium popoagicum* gen. et. sp. nov. *Char. gen.* Dentition much as in *Limnolys*, excepting that there is a diastema in front of the second inferior premolar. Presence of first inferior premolar not ascertained. Fourth inferior premolar without posterior cusps. Superior molars with an angular ridge extending inwards from each inner cusp. Last inferior molar with heel. This genus differs from *Oligotomus* in the simplicity of the fourth premolar, which has, in the latter, two posterior

cusps. The V-shaped crests of the inferior molars separate it from *Hyracotherium*. *Char. specif.* The heels of the second and third premolars have a median keel; the third only has an anterior tubercle. The crest of the heel of the fourth forms an imperfect V. Heel of the last true molar small. No cingula; enamel smooth. Length of molar series .080; of true molars .044; of last molar .019; depth of ramus at first premolar .021; at last molar .031. Second specimen. Diameters of crown of last superior molar: anteroposterior .014; transverse .016. About the size of the *Hyrachyus agrestis*. Three individuals.

(14) *Hyracotherium angustidens* Cope, jaws of three specimens. (13) *Hyracotherium vasacciense* Cope, one jaw. (16) *Hyracotherium vortmani* sp. nov. About the size of the *H. tapirinum* Cope, but with the opposite cones of the inferior molars not united by cross-crests. There is a tubercle between the posterior pair of the first inferior true molar. The anterior tubercles of the fourth premolar are close together, and there is a strong cusp anterior to these. No basal cingulum on this tooth. Length of molars 3 + 4 + 5, .025; depth of ramus at p. m. iv .018.

(17) *Hyracotherium craspedotum* sp. nov. Size of *H. tapirinum*, but the tubercles of the inferior molars are not connected by cross crests, and they all possess a strong external basal cingulum, which also extends round on the posterior base of the I and II true molars. Heel of fourth premolar with a diagonal ridge; two anterior cusps well separated, and no tubercle in front of them. Second premolar with narrow heel; last true premolar with wide heel. Length of molar series .056; of true molars .033; of last molar .014; depth of ramus at second premolar; .018 at last true molar .023.

(18) *Lophiodon calciculus* sp. nov. Represented by lower jaws of three specimens, one with superior molars. Transverse crests of inferior molars not connected by oblique ridges. Last true molar with a very small tubercle-like heel. A weak external basal cingulum; enamel smooth. Third and fourth premolars with wide heels, each with a single low ridge. Length of molar series .053; of true molars .033; of last true molar .014; depth of ramus at penultimate molar .025. Diameters of penultimate superior molar at No. 2: anteroposterior .012, transverse .014.

(19) *Lophiodon ventorum* sp. nov. Larger than the last, and differing in having a large heel of the last true molar, and an elevated external tubercle on the heel of the fourth premolar. Enamel wrinkled, no external cingulum. Second premolar with a very short heel with an acute tubercle. Length of molar series .064; of true molars .040; of last true molar .016; depth of ramus at second premolar .020; at third true molar .030. Two individuals in the collection.

From the preceding it appears that this fauna, though in general that of the Wasatch Eocene, present certain peculiarities.

Passing by the absence of fishes and crocodiles, which may yet be found, we have, for the first time, the association of *Palaeosyops* with *Coryphodon*, genera hitherto characteristic of the Bridger and Wasatch beds respectively. The occurrence of true *Lophiodons*, for the first time exactly determined in America, is an interesting circumstance. Bats have not been recognized hitherto in the Wasatch formation.—*E. D. Cope*.

#### GEOGRAPHY AND TRAVELS.<sup>1</sup>

THE ROYAL GEOGRAPHICAL SOCIETY'S EXPEDITION TO LAKES NYASSA AND TANGANYIKA.—The serious misfortune which befell this exploring party in the loss of their leader, Mr. Keith Johnston, soon after their departure from the coast,<sup>2</sup> has not prevented the successful execution of the work assigned them. Mr. Thomson, who succeeded to the command, has completed his explorations, arrived back at Zanzibar and sailed for England about the middle of last July. His journey is the most important made in Africa during the past year. It is to be regretted that no observations could be taken, and that therefore Mr. Thompson's maps are not strictly accurate, but his descriptions, in his reports to the Society, of the countries and peoples visited, are clear and full, and contain much of great interest.

After the death of Mr. Johnston on the 28th of June, 1879, the expedition renewed its march over a country "half jungle, half forest," succeeded in a few days by a more varied tract broken by sharp ridges and narrow glens. Basalt appeared at the surface in a very discomposed form. In the glens there was an abundant flora, while on the tops of the ridges, owing to the too porous soil, everything green was shriveled up, even to the trees, under the fierce sun. "A porous surface stratum in Africa has always this result; if the surface is not damp and marshy it becomes a desert." Crossing the River Ruaha, one of the chief branches of the Lufigi, at about long. 37° E., lat. 8° S., it was found quite unnavigable even for canoes, owing to the rapids and rocks. The Uranga, the other branch of the Lufigi, is, however thought to be navigable for the largest river boats as far as the point visited at Mkomkero, in the M'henge country, and probably further.

The M'henge country is a plain kept constantly damp throughout the year at the base of the M'henge mountains, and is necessarily very fertile. It is about forty miles in length by twenty broad, and occupies the angle formed by the junction of the Ruaha and Uranga. The people are a superior race to the neighboring tribes. Their houses are generally built on poles, and are of the most peculiar character, in some cases being built on a platform with a huge roof (the house being circular) projecting

<sup>1</sup> Edited by ELLIS H. YARNALL, Philadelphia.

<sup>2</sup> See NATURALIST for October, 1879, p. 660.